

# Genetic Analysis of *Xylella fastidiosa* in Texas

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## Situation in Texas

- High bacterial load  
Gulf coast plants (15-20%)

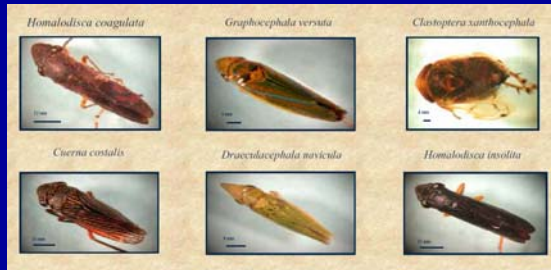


## Situation in Texas

- High vector diversity



The CA vectors



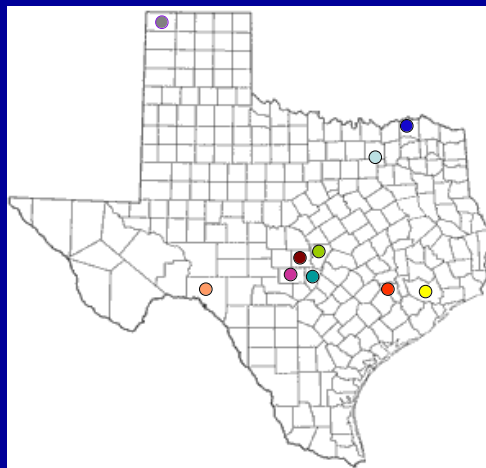
The TX vectors



*Oncometopia orbona*

## Situation in Texas

- Movement of PD into central Texas and unexpected counties



## ***Xylella fastidiosa* clades**

- Citrus Variegated Chlorosis (CVC) and Coffee Leaf Scorch (CLS)
- Pierce's Disease (PD)
- Oleander Leaf Scorch
- Almond Leaf Scorch (ALS)
- Hardwood/Angiosperm/Ragweed

## ***Xylella fastidiosa* clades**

- Citrus Variegated Chlorosis (CVC) and Coffee Leaf Scorch (CLS)  
(subspecies *pauca*)
- Pierce's Disease (PD)  
(subspecies *piercei*)
- Oleander Leaf Scorch
- Almond Leaf Scorch (ALS)
- Hardwood/Angiosperm/Ragweed  
(subspecies *multiplex*)

## The Questions

1. Which strains of *X. fastidiosa* are present in Texas?
2. What is the diversity of strains compared to California?
3. Which strains are found in which plants?
4. How can small strain differences be used to map strain movement in the state?
5. Which strains of *X. fastidiosa* are carried by different vectors?
6. How does the movement of insects impact the epidemiology of PD in Texas?

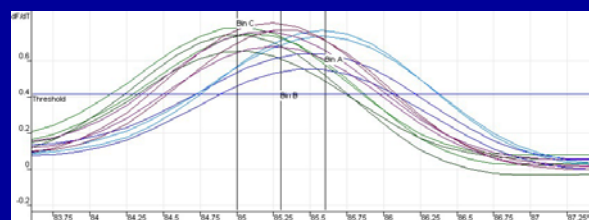
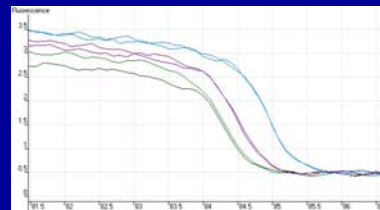
## Initial Screen

- Isolates from wild vines, rootstocks, hybrid vines, weeds, shrubs, trees
- Sequence the *gyrB* gene and the *mopB* gene
- Check sequence data against digestion method and QRT-PCR method

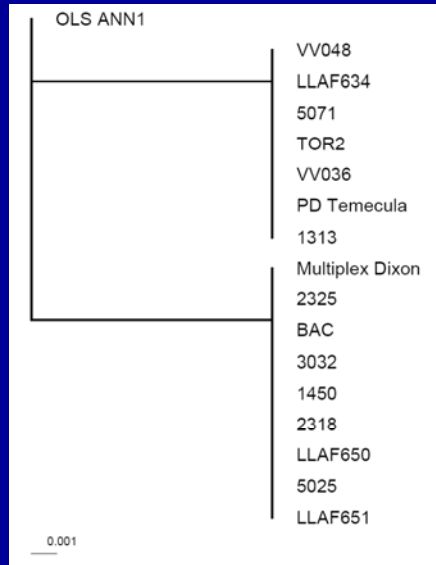
L 1 2 3 4 L 5 6 7 8

G I G II R III R IV G I G II R III R IV

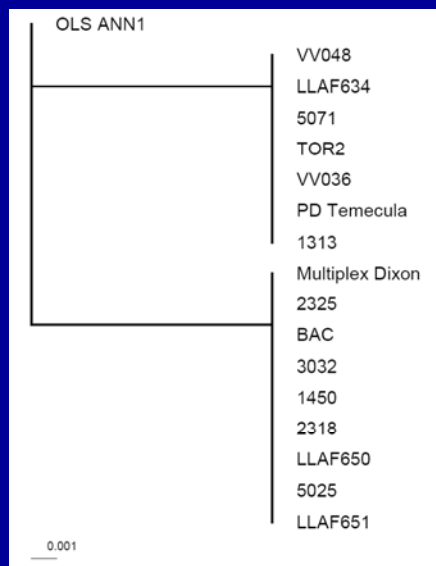
BsrDI digestion TaqI digestion

[illegible]

# Preliminary Phylogenetics



# Preliminary Phylogenetics



**We now have  
strains from  
oleander!**

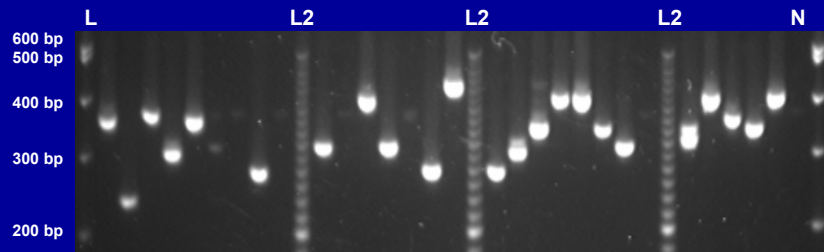
## Observations from Initial Screen

- Texas ragweed (*multiplex*) strain found in sea myrtle, Mexican hat, western ragweed, giant ragweed, annual sunflower, heartleaf ampelopsis, cedar elm
- PD (*piercei*) strain found in *Vitis vinifera* varieties, also wild *Vitis* and *Vitis* hybrids
- *Ampelopsis cordata* is in the Vitaceae and yet hosted ragweed strain

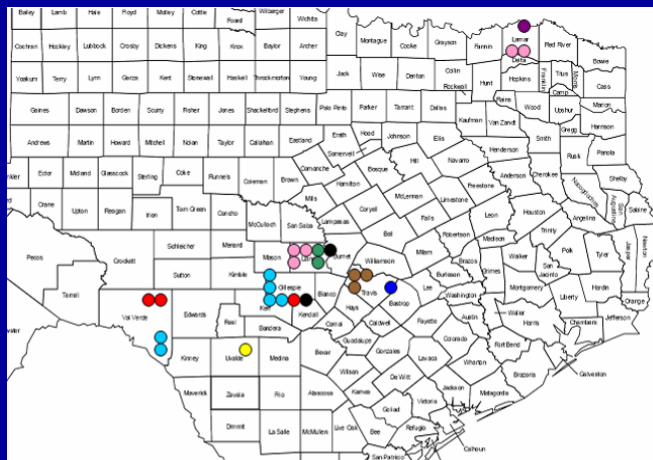
## Broader Look

- Over 70 isolates screened as either grape or ragweed
- Grape strain always found in *Vitis sp.*
- Ragweed found in everything else (need to check new isolates from oleander)

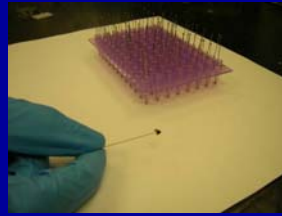
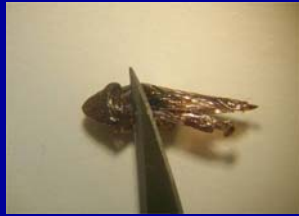
# Fingerprinting



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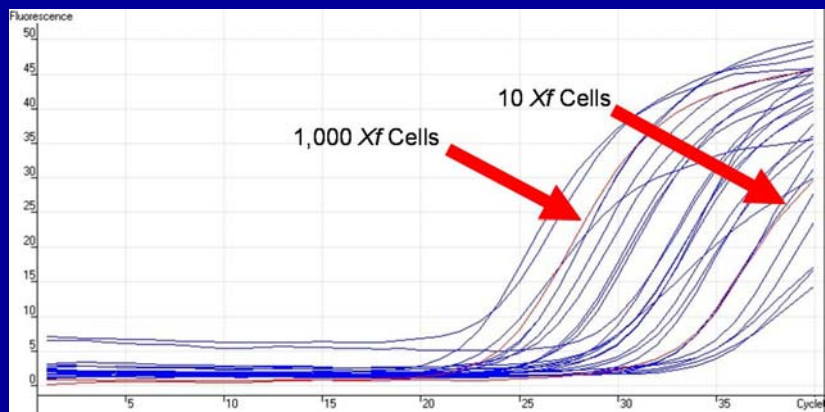






**QRT-PCR**

## QRT-PCR



# Strain Differences Melt Curves QRT-PCR

```

PD (Temecula) 1 cagttagaggtgtcagogaacoggtactacattacgttttaaacoggcaaaagagatcttcagtgatg 70
ALS (Dixon) 1 cagttagaggtgtcagogaacoggtactacattacgttttaaacoggcaaaagagatcttcagtgatg 70
OLS (AJN) 1 cagttagaggtgtcagogaacoggtactacattacgttttaaacoggcaaaagagatcttcagtgatg 70

PD (Temecula) 71 tggagtttcattacgaasatcttgcaagcgctccogtgagttatcctctcaattccggccttaagt 140
ALS (Dixon) 71 tggagtttcattacgaasatcttgcaagcgctccogtgagttatcctctcaattccggccttaagt 140
OLS (AJN) 71 tggagtttcattacgaasatcttgcaagcgctccogtgagttatcctctcaattccggccttaagt 140

PD (Temecula) 141 cagtttgattgatgaacgtggtgaaggtggcggaagattttcactatgaaggtggatcttgtagcttt 210
ALS (Dixon) 141 cagtttgattgatgaacgtggtgaaggtggcggaagattttcactatgaaggtggatcttgtagcttt 210
OLS (AJN) 141 cagtttgattgatgaacgtggtgaaggtggcggaagattttcactatgaaggtggatcttgtagcttt 210

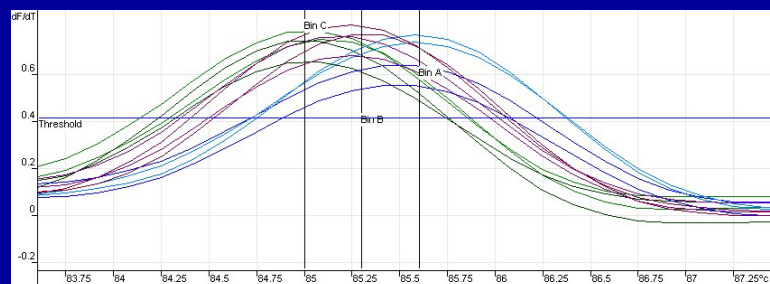
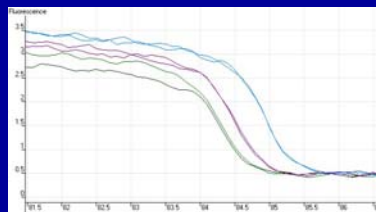
PD (Temecula) 211 gtagaacatttgaactcaattgaagaccccaattgcabccgaatgaatttcggtaacggagacacacg 280
ALS (Dixon) 211 gtagaacatttgaactcaattgaagaccccggtgcabccgaatgaatttcggtaacggagacacacg 280
OLS (AJN) 211 gtagaacatttgaactcaattgaagaccccggtgcabccgaatgaatttcggtaacggagacacacg 280

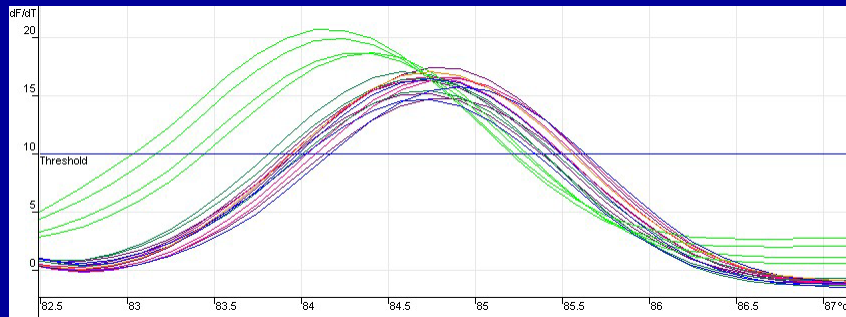
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ALS (Dixon) 281 gcattgtgtggatgctgctttacagtggaactgactgactacgaagaaacaaatgattgtttacaaataa 350
OLS (AJN) 281 gcattgtgtggatgctgctttacagtggaactgactgactacgaagaaacaaatgattgtttacaaataa 350

PD (Temecula) 351 cattccacaaaaagatgcggtacccacctgtgcttccgtgctgcatgactcgtaacctgggttaa 420
ALS (Dixon) 351 cattccacaaaaagatgcggtacccacctgtgcttccgtgctgcatgactcgtaacctgggttaa 420
OLS (AJN) 351 cattccacaaaaagatgcggtacccacctgtgcttccgtgctgcatgactcgtaacctgggttaa 420

PD (Temecula) 421 tacattgagcagaatgggttggtaggcaagcagaatcactttttcgggtgatgatgctggaag 488
ALS (Dixon) 421 tacattgagcagaatgggttggtaggcaagcagaatcactttttcgggtgatgatgctggaag 488
OLS (AJN) 421 tacattgagcagaatgggttggtaggcaagcagaatcactttttcgggtgatgatgctggaag 488
    
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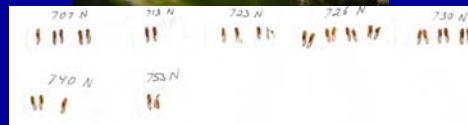
# Strain Differences Melt Curves QRT-PCR





## Other Life History Characteristics

- Population Biology
  - ISSR
  - AFLP
- Viral Presence
  - rt PCR
- Age
  - Wing pigment





## Acknowledgements


Front: Aika Choudhry, Natalie Vitovsky, Jennifer Milliron, Alicia Fernandez, Kaelynn Alexander, Stanley Gunawan. Back: Skylar Stanger, Stephanie Jackovich, Brian Jackson, Daymon Hail, Andrew Ambort, Blake Bextine

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  - Isabelle Lauzière (TAMU)
  - Jeff Brady (TAMU)
  - Mark Black (TAMU)
  - Matt Blua (UCR)
  - TAMU-Overton

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**Department of Biology**



- Home
- Meet the Lab
- History of PD
- Morano's Research


Additional Useful Links:



Lisa Morano, Ph.D.  
Associate Professor, University of Houston - Downtown

## UHD Pierce's Disease Research

Research and Education Excellence



Dr. Lisa Morano has been studying *Xylella fastidiosa*, the causative bacteria in Pierce's Disease for over 4 years. Directing undergraduate students at the University of Houston - Downtown and in collaboration with scientists at the [University of California, Riverside](#) and the [University of Texas at Tyler](#) as part of the Texas Pierce's Disease Research and Education Program. [Dr. Morano](#) is also interested in several other topics within the area of viticulture and enology.

### Purpose of this Website

- Portal to basic information regarding Pierce's Disease and the *Xylella fastidiosa* bacterium
- Disseminate relevant research and information to growers and scientists as it becomes available
- In time: Allow for interaction among viticulturists and researchers in mapping disease spread and identifying novel strains of *X. fastidiosa*.

[www.uhd.edu/pdresearch](http://www.uhd.edu/pdresearch)